

The claimed invention is:

1. An exhaust treatment device, such as a catalytic converter for a vehicle, comprising:

5 an inner housing having an inlet and an outlet defining a longitudinal direction and having a thermally-activated exhaust treatment device therein chosen to reduce undesirable emissions from the exhaust of a combustion engine as the exhaust passes from the inlet to the outlet;

10 an outer housing enclosing the inner housing but characteristically not contacting the inner housing, the outer housing including an inlet and an outlet that align with the inlet and outlet of the inner housing, the inner and outer housing including walls forming a sealed cavity around the inner housing, the cavity having a vacuum drawn therein; and

a support including a plurality of spokes that extend radially between the inner and outer housings.

15 2. The device defined in claim 1, wherein the spokes having a cross section large enough to provide sufficient strength to hold the inner housing in the outer housing without permitting contact between the inner and outer housing, but further being minimally sized to minimize conductive heat loss through the spokes from the inner housing to the outer housing.

20 3. The device defined in claim 2, wherein the spokes are made from a high nickel stainless steel that is greater than 30% nickel.

25 4. The device defined in claim 3, wherein the spokes have a cross section that is relatively thin in the longitudinal direction.

5. The device defined in claim 4, wherein the spokes include inner and outer ends, one of the inner and outer ends including wire mesh supporting the one end on the associated one of the inner and outer housing.

30 6. The device defined in claim 4, wherein the spokes include inner and outer ends, one of the inner and outer ends including ceramic pads supporting the one end on the associated one of the inner and outer housing.

7. The device defined in claim 1, wherein the spokes are made from Inconel material.

5 8. The device defined in claim 1, wherein the spokes have a cross section that is less than about 1.5 mm in its narrowest dimension.

9. The device defined in claim 1, wherein the spokes include inner and outer ends, one of the inner and outer ends including wire mesh supporting the one end on the
10 associated one of the inner and outer housing.

10. The device defined in claim 1, wherein the spokes include inner and outer ends, one of the inner and outer ends including ceramic pads supporting the one end on the
15 associated one of the inner and outer housing.

11. The device defined in claim 1, wherein the support slidably engages one of the inner and outer housings.

12. The device defined in claim 1, wherein the spokes are flexible in a direction
20 perpendicular to their length, such that the spokes flex to accommodate a relative increase in a length of the inner housing over the outer housing when the inner housing thermally expands significantly more than the outer housing.

13. The device defined in claim 1, wherein the spokes are elongated and have a
25 length to width ratio of at least about 3 to 1.

14. The device defined in claim 1, wherein the spokes have a tubular cross section.

15. The device defined in claim 1, wherein the support comprises a one-piece
30 component having an inner ring flange and an outer ring flange with the plurality of spokes extending therebetween.

16. The device defined in claim 1, wherein the exhaust treatment device includes a catalytic material.

17. An exhaust treatment device for vehicles comprising:

5 an inner housing having an inlet and an outlet defining a longitudinal direction and having a thermally-activated exhaust treatment device therein chosen to reduce undesirable emissions from the exhaust of a combustion engine as the exhaust passes from the inlet to the outlet;

10 an outer housing enclosing the inner housing but characteristically not contacting the inner housing, the outer housing including an inlet and an outlet that align with the inlet and outlet of the inner housing, the inner and outer housing including walls forming a sealed cavity around the inner housing, the cavity having a vacuum drawn therein; and

15 a support that support the inner housing in the outer housing, the support including a radially-extending body and including a foot that engages at least one of the inner and outer housing, the foot including an insulative material different from the body, the insulative material being chosen to minimize conductance of heat.

18. The device defined in claim 17, wherein the feet include insulative material selected from one of wire mesh, ceramic, and a composite.

19. The device defined in claim 18, wherein the feet include wire mesh.

20. The device defined in claim 18, wherein the feet include ceramic pads.

21. The device defined in claim 18, wherein the feet include composite.

22. The device defined in claim 17, wherein the feet slidably engage the one housing.

23. The device defined in claim 17, wherein the exhaust treatment device includes a catalytic material.

24. An exhaust treatment device for vehicles comprising:

an inner housing having an inlet and an outlet defining a longitudinal direction and having a catalytic material therein chosen to reduce undesirable emissions from the exhaust of a combustion engine as the exhaust passes from the inlet to the outlet;

5 an outer housing enclosing the inner housing but characteristically not contacting the inner housing, the outer housing including an inlet and an outlet that align with the inlet and outlet of the inner housing, the inner and outer housing including walls forming a sealed cavity around the inner housing, the cavity having a vacuum drawn therein; and

10 a support that support the inner housing in the outer housing, the support including a radially-extending body and including a foot that slidably engages at least one of the inner and outer housing.